THE NATURAL DISTRIBUTION AND BIOLOGICAL STATUS OF HELENIUM AMARUM AND H. BADIUM (ASTERACEAE, HELIANTHEAE)

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Helenium amarum and H. badium, according to Bierner (1972) make up the only elements of the section Amarum of the genus Helenium. They are both highly weedy taxa and, while originally native to the southcentral United States (mainly Texas and Louisiana), they have become widespread weeds elsewhere. The species are characterized by having ray florets with broadly obdeltoid ray ligules, involucral bracts narrow and reflexed at maturity, the outer series longer than the inner, and mostly linear-filiform, nondecurrent, leaves. Rydberg (1915) distinguished between the two species as follows:

Disk yellow; leaves all entire....H. tenuifolium (= H.amarum)

Disk purple-brown; some of the lower stem-leaves pinnately parted.....H. badium

The two species, as noted, were maintained by Rock (1957), Correll and Johnston (1970) and Bierner (1972, 1974) although the latter author has long recognized the very close relationship of the taxa (pers. comm.). Bierner (1974) also was aware of its weedy nature and its proclivity to spread as an immigrant to other regions, commenting that H. amarum "probably owes much of its present-day distribution to our highway systems since it appears to have spread eastward from Texas-Louisiana mainly during the past 50-75 years." While he does not document this statement, the present contribution shows that his surmize is largely accurate.

Helenium amarum was apparently first described by Rafinesque in 1817, who dubbed this Galardia amara, this being an earlier name for Helenium tenuifolium (Rock, 1957) which name Rydberg (1915) adopted for his treatment of Helenium in the North American Flora. Rock (1957) typified Rafinesque's name, which was accompanied by a fairly good protologue but without cited specimens, with a neotype (Ball 182, 6 Sep 1898, collected at Alexandria, Rapides Parish, Louisiana, US).

Fig. 1 shows the current distribution of Helenium amarum and H. badium as determined from specimens at GH, TEX and US. The question arises as to whether the collections of H. amarum

indicated as occurring outside of Texas and Louisiana are relatively recent introductions, as suggested by Bierner (1974). To this end we have tabulated some of the earliest collections of this taxon for various states.

TEXAS:

Goliad Co.: Berlandier 2514 (=1084) May 1834 (GH)
Harris Co.: Engelmann s.n. May 1842 (GH)
Comal Co.: Lindheimer 108 1843 (GH)

LOUISIANA:

New Orleans: Drummond 157 1832 (GH, TEX)

OKLAHOMA:

Tulsa Co.: Bush 322 Jul 1894 (GH)
(said to be "common" on the label)

ARKANSAS:

Hot Springs: Rau s.n. Aug 1879 (GH)
Little Rock: Hasse s.n. May 1886 (GH)

MISSISSIPPI:

Jackson Co.: Seymour 91827.60 Aug 1891 (TEX)

KANSAS:

Labette Co.: Hitchcock 738 1896 (GH)

MISSOURI:

Butler Co.: Eggert s.n. Jul 1892 (GH)
Dunklin Co.: Bush 71 Sep 1893 (GH)
Barry Co.: Blankenship s.n. Aug 1895 (GH)
(The label records,"This is now its furtherist range northward, passing up from south along lines of travel.")

TENNESSEE:

Chattanooga: Biltmore 3982b Aug 1897 (GH)

ALABAMA:

Mobile Co.: Crawford 853 Aug 1950 (TEX)

FLORIDA:

Manatee Co.: Garber s.n. Sep 1877 (GH)

INDIANA:

"Yankietown": Deam 51497 Oct 1931 (TEX)
("In hoglot", "first record for Indiana")

KENTUCKY:

Whitley Co.: Smith 3810 Jul 1937 (GH)

GEORGIA:

Thomas Co.: Taylor s.n. Sep 1903 (LL)

SOUTH CAROLINA:

Anderson Co.: Davis 8042 Jul 1917 (TEX)

NORTH CAROLINA:

New Hanover Co.: Williamson s.n. 1892 (LL)

VIRGINIA:

Fairfax Co.: Blake 8913 Oct 1924 (LL)

MARYLAND:

Baltimore Co.: Foreman s.n. before Oct. 1871 (GH)
(This specimen is mounted on a sheet with H. amarum from Texas, Parry 522; in the packet with this specimen is a letter to A. Gray from E. Foreman, dated 31 Oct 1871 which reads "I have failed to find it [the plant] described in your Manual (1876) ... collected 3 mi. NW of Baltimore")

CONNECTICUT:

"Bridgeport, railroad yard" Eames 8139 Sep 1908 (GH)

As can be seen from the above, H. amarum was first noted for Louisiana and adjacent east Texas. It apparently spread northwards and northeastwards out of this area as commerce, railways and roadwards developed into or out of this region. The taxon prospers in disturbed areas, especially in fallow fields and overgrazed grassy regions, the plant being bitter, bestowing a bitter taste to milk obtained from cows forced to feed upon it, as noted by Rafinesque in his original description of the species. No doubt yet earlier collections exist for this taxon for the various states mentioned above, but perhaps not much earlier than those listed.

Helenium amarum is largely found in open woodlands or grassy regions on heavy clay soils with an annual rainfall of 30-60 inches. It is not unexpected then, that this weedy taxon has expanded northwards and eastwards. Helenium badium, on the other

hand, is largely a taxon of the drier regions of the southwestern U.S.A. occurring mostly in central Texas with peripheral populations in adjacent Oklahoma and along the Rio Grande in adjacent Mexico.

Nevertheless a single collection of H. badium has been recorded by the late S.F. Blake from Washington, D.C. as follows:

"Rays yellow; disk purple. Single plant in dirt around tree on sidewalk, Independence Ave. between 12th and 14th Sts. S.W." 3 Aug 1940, Blake 12224 (LL).

This brings us to the final question posed in this paper: are the two taxa of the section Amarum (sensu Bierner, 1972) good species, or merely regional variations of a single species, H. amarum.

As indicated by the above key leads constructed by Rydberg to distinguish between these taxa, they reportedly differ primarily by disk color and the degree of dissection of the lower leaves. Actually these are very variable characters, presumably controlled by relatively few genes. Indeed, over a 10 year period, or more, the junior author has observed a single "mixed" population of these two head-forms along the Colorado River in Austin, Texas (just north of the Zilker Botanical Gardens) come up each year from the seeds spread naturally from the previous years' growth and without fail the population has maintained individuals with both reddish-brown disks and yellow disks. In some years the 100 or more individuals concerned have had predominately yellow disks, in other years predominately reddish-brown disks. But no other character or group of characters will serve to distinguish between them.

Nevertheless, as one ascends the Edwards Plateau and proceeds westwards to drier regions (rainfall 15-30 inches per year) the populations soon become completely reddish-brown and the lower leaves take on a more pinnatisect aspect; likewise, as one leaves the Edwards Plateau eastward the plants tend to become somewhat more robust with only yellow disks and the lower leaves are less dissected.

Correll and Johnston (1970) were well aware of the relatively trivial features which have been used to distinguish between the two taxa, commenting under their Helenium badium: "Identical to the last [H. amarum] but the lobes of the disk corolla red-brown so that the disk appears dark.... This can easily be considered merely a variety of H. amarum but it is more restricted geographically to calcareous disturbed soils of the Edwards Plateau, Plains Country and Trans-Pecos, infrequently farther e... also Okla." Clearly this was also the view of Gray who originally treated H. badium as a variety of H. tenuifolium (=H. amarum, cf. below).

It appears then that Sect. Helenium of Rock is best treated as monotypic, the single species comprised of two regional

intergrading varieties as follows

HELENIUM AMARUM (Raf.) Rock var. AMARUM, Rhodora 59:131. 1957.

Galardia amara Raf.
Helenium tenuifolium Nutt.

Type and distribution as discussed above.

HELENIUM AMARUM var. BADIUM (S. Wats.) Waterfall, Rhodora 62: 321. 1960.

Helenium badium (S. Wats.) Greene

Helenium tenuifolium var. badium A Gray ex S. Wats.

In his protocol Watson cited several collections as follows: Bluffton, Texas, E. Palmer 716 (GH!); "Bottoms," Austin, Texas, May 20, 1872, E. Hall 364 (GH!); and J. Reverchon, "Southwestern Texas." Bierner, by annotation at GH, lectotypified var. badium with the Hall Collection. The type locality is probably not too far removed from the populations observed by the junior author, mentioned above, bottoms along the Colorado River, on sandy shelves.

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LITERATURE CITED

Bierner, M.W. 1972. Taxonomy of Helenium sect. Tetrodus and a conspectus of North American Helenium (Compositae). Brittonia 24: 331-355.

_____ . 1974. The taxa of Helenium in Tennessee. Castanea 39: 346-349.

Rock, H.F.L. 1957. A revision of the vernal species of Helenium (Compositae). Rhodora 59: 101-216.

Rydberg, P.A. 1915. Helenium, in N. Amer. Fl. 34: 120-131.

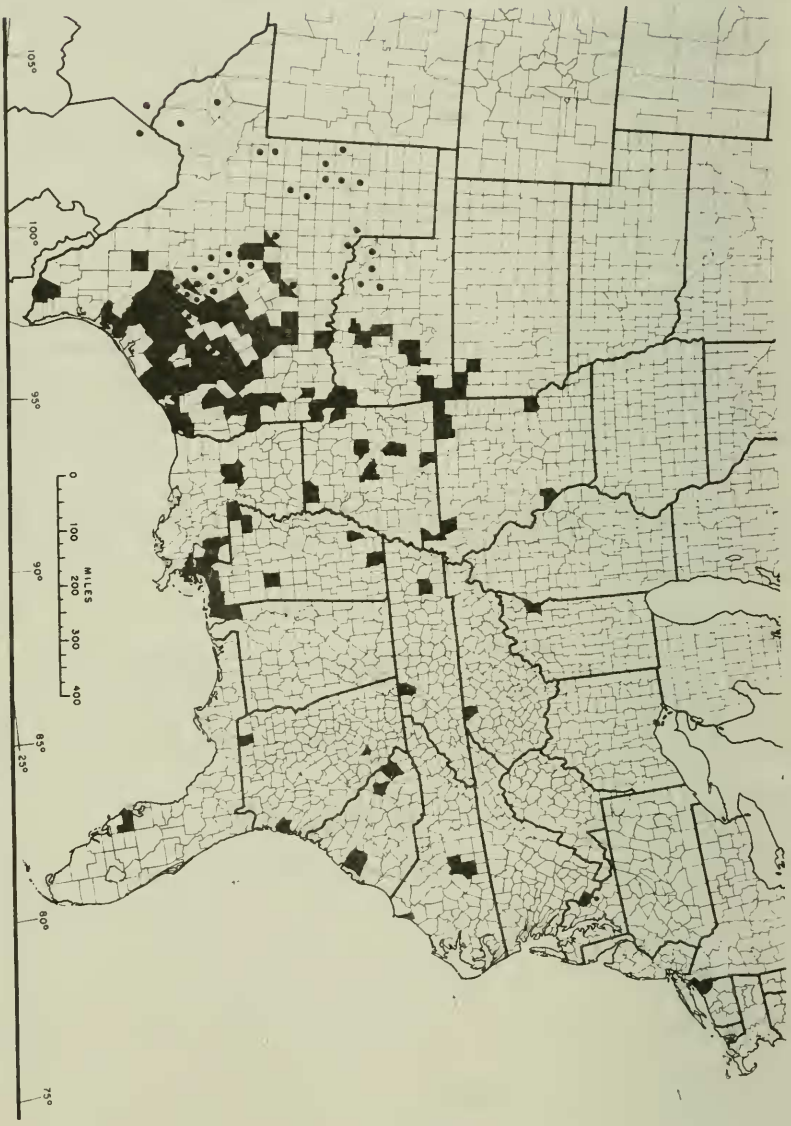

Fig. 1. Distribution of *Helenium amarum*: (•) var. *badium*; county shading, var. *amarum*